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CLAIMS:

A pharmaceutical composition for vaccination, comprising:-1.

(i) a bacterial Cu, Zn-superoxide dismutase (Cu, Zn-SOD) of the dimeric type, or a fragment, variant or derivative of the Cu,Zn-SOD, wherein antibodies raised against said fragment, variant or derivative also bind intact full length Cu,Zn-SOD; or

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(ii) a nucleic acid coding for the Cu, Zn-SOD fragment, variant or derivative; and

a pharmaceutically acceptable carrier.

- A pharmaceutical composition according to Claim 1, wherein said 2. composition provides protection against meningococcal infection.
- A pharmaceutical composition according to Claim 1 or 2, wherein said 3. provides immunity protective composition pleuropneumoniae infection.
 - A pharmaceutical composition according to Claims 1 or 2, wherein said composition provides protective impaunity to infection from a gram negative bacterial species selected from the group consisting of Pasteurellaceae; Neisseria; Haemophilus; Salmonella; and Escherichia.
- 5. A pharmaceutical composition according to any previous claim, wherein the Cu,Zn-SOD is obtainable from a recombinant gene cloned from bacteria.
- A vaccine comprising (i) a bacterial Cu, Zn-superoxide dismutase (Cu, Zn-SOD) of the dimeric type, or a fragment, variant or derivative of the Cu,Zn-SOD, wherein antibodies raised against said fragment, variant or derivative

also bind intact full length Cu,Zn-SOD; or (ii) a nucleic acid coding for the bacterial Cu,Zn-SOD fragment, variant or derivative.

- 7. A vaccine according to Claim_6, wherein the Cu,Zn-SOD is obtainable from a recombinant gene cloned from bacteria.
- 8. A vaccine according to Claims 6 or 7, wherein said vaccine provides protection against meningococcal infection.
- 9. A method of preparing a pharmaceutical composition comprising:-
 - 1) isolating a gene for a bacterial Cu,Zn-SOD of the dimeric type or a fragment, variant or derivative of the Cu,Zn-SOD, wherein antibodies raised against said fragment, variant or derivative also bind the full length intact Cu,Zn-SOD; and
 - 2) (a) synthesising the Cu,Zn-SOD fragment, variant or derivative from the gene; and combining said Cu,Zn-SOD, fragment, variant or derivative, with a pharmaceutically acceptable parrier, or
 - (b) combining said gene with a pharmaceutically acceptable carrier.
- 10. A pharmaceutical preparation comprising an antibody to a bacterial Cu,Zn-SOD of the dimeric type, or a fragment, derivative or variant of the Cu,Zn-SOD, wherein antibodies raised against said fragment, derivative or variant also bind intact full length Cu,Zn-SOD; and a pharmaceutically acceptable carrier.
- 11. A pharmaceutical preparation according to Claim 10, wherein said antibody provides protective immunity to meningococcal disease.

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- 12. A pharmaceutical preparation according to <u>Claim</u> 10, wherein said composition provides protective immunity to <u>Actinobacillus</u> pleuropneumoniae infection.
- 13. A pharmaceutical preparation according to Claim 10 or 11, wherein said composition provides protective immunity to infection from a gram negative bacterial species selected from the group consisting of Pasteurellaceae; Neisseria; Haemophilus; Salmonella; and Escherichia.
- 14. A pharmaceutical preparation according to any of Claims 10 to 13, wherein said antibody displays bactericidal activity.
- 15. A multivalent vaccine comprising a plurality of Cu,Zn-SODs of the dimeric type, or fragments, derivatives or variants thereof, wherein antibodies raised against said fragments, derivatives or variants also bind intact full length Cu,Zn-SOD, and wherein said plurality of Cu,Zn-SODS are from the same or different species of Gram negative bacteria.
- 16. A multivalent vaccine comprising a bacterial Cu,Zn-SOD of the dimeric type, or fragments, derivatives or variants thereof, wherein antibodies raised against said fragments, derivatives or variants also bind intact full length Cu,Zn-SOD; and a second protein that is not a Cu,Zn-SOD.
- 17. A multivalent vaccine according to Claims 15 or 16, wherein said vaccine provides protective immunity to meningococcal disease.
- 18. Use of a bacterial Cu,Zn-superoxide dismutase of the dimeric type, or a fragment, derivative or variant of the Cu,Zn-SOD, wherein antibodies raised against said fragment, derivative or variant also bind intact full length Cu,Zn-SOD; in the manufacture of a medicament for treatment or prevention of bacterial infection.



- 20. Use according to Claims 18 or 19 wherein the bacterial infection is due to meningoeoccal infection.
- 21. Use according to Claim 18, wherein said composition provides protective immunity to Actinobacillus pleuropneumoniae infection.
- 22. Use according to Claim 19, wherein said gram negative bacterial species selected from the group consisting of *Pasteurellaceae*; *Neisseria*; *Haemophilus*; *Salmonella*; and *Escherichia*.
- 23. Use of a nucleic acid encoding a bacterial Cu,Zn-superoxide dismutase of the dimeric type, or a fragment, derivative or variant of the Cu,Zn-SOD, wherein antibodies raised against said fragment, derivative or variant also bind intact full length Cu,Zn-SOD, in the manufacture of a vaccine against bacterial infection.
- 24. Use of an antibody specific to bacterial Cu,Zn-SOD of the dimeric type, or a fragment of the antibody, in the manufacture of a medicament for treatment or prevention of bacterial infection.
- 25. Use according to Claim 24 wherein the antibody is a monoclonal antibody.
- 26. Use according to Claims 24 or 25 wherein the bacterial infection is due to meningococcal infection.
- 27. A method of treating or preventing bacterial infection comprising administering an effective amount of a bacterial Cu,Zn-SQD or fragment, variant or derivative of the Cu,Zn-SQD, wherein antibodies raised against said fragment, variant or derivative also bind intact full length Cu,Zn-SQD.

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